VOL. XI, NO. 6.—BOTANICAL GAZETTE.—JUNE, 1886.

Specimens and Specimen Making.

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In arranging the material under this head it has been necessary to omit a part of some of the articles in order to prevent unnecessary repetition, an unavoidable contingency when the same subject is treated independently by several writers, but no other material changes have been made.—EDITORS.

Comparing old herbarium material with that of recent distribution, one is struck with the fact that the art of specimen making has of late years, and particularly in this country, reached a degree of perfection never aimed at by the collectors of former days. The present herbarium sheet permits a fullness of representation that was not practicable on the foolscap pages of Linnæus; and accordingly we must now give the whole plant if possible, or as much of it as can conveniently be doubled up within the space of 16½ by 11½ inches. The ideal specimen presents all possible material requisite for its critical determination or complete description. Better therefore for science is a sheet covered with a crowded, bulky plant, than one decorated with scraps of leaves, flowers and fruits. But in such cases, and in many others too, the flowers detached from their peduncles should be dried separately, and should have the benefit of the collector's utmost skill *præparationis conservatricis opere*. Envelopes of very bibulous paper, cotton pads, heated driers, and pressure graduated according to wilting, will serve as an embalming process, preserving every structure and organ, from petal to embryo, uninjured, and ready to live again at the demand of the student and the touch of hot water. Such objects ought not, like the rest of the plant, to be glued down to the sheet; they should be kept in pockets attached to it. At some future day more skill may be exacted of the specimen-maker. The countryman and the cabinet-maker recognize trees by their bark and grain of wood. When the botanist shall have invented terms to describe them, a complete specimen of an arboreous plant will include bark and wood-sections.

Methods that hurry the drying out of plants in press are valuable to the traveling collector. With that view let him use latticework frames to separate every four to six inches of the pile. They will permit the passage of evaporating air and heat, and will serve also to bring the sides and corners of the pile under better pressure. The pile of plants thus separated, and bound as tightly by three straps as may be thought best, should be kept in about the hottest place on the premises. A metal roof in the sunshine by day, a warm corner in the kitchen by night, will draw off rapidly vast quantities of moisture, and will give fresh, bright specimens. For this process driers not less than 18 by 12 inches are needed.

Although the numbering of distributions is now very general, still, it is not

done universally, and not always with the right conception of its object. M. de Candolle, whose experience gives him a better right to speak than any other botanist, has insisted with emphasis that all collections distributed among important herbaria should be numbered. The number is not to show the collector's systematic reference of the specimen, and it does not necessarily include all his specimens that belong to the same species. It designates merely specimens that belong to the same stock, or such as from locality, date or other circumstances, he can with equal certainty assume to be identical with each other and true duplicates. The citation of such numbers, fulfilling as it does phytography's law of brevity, has become very general on the part of authors of Floras, Monographs, etc., and every specimen under the same number in other herbaria becomes in this way elevated to the rank of a voucher and original of a description.

Each volume, excepting the first one, of DC. Monogr. Phaner. tabulates under collectors' names in a separate index the numbers of all the specimens cited. This facilitates greatly the application of authoritative determinations to the unnamed material in herbaria. It is to be hoped the precedent will be followed. *Les noms changent, c'est inévitable, les numéros seuls subsistent.* M. de Candolle appeals to the vanity of the collector and assures him that the names of species and their authors have but a precarious existence; whereas he guarantees an immortality to the numbers of Commerson, Burchell, Berlandier, Wydler, and others. A like distinction may be prophesied for such citations as: Pl. Cubens. Wright, 2740; Fendler Pl. Venez. 2176; Glazion Pl. Brasil. 15795; Parry Rocky Mt. Fl. 311; Curtiss N. Am. Pl. 1186; Pringle Pl. Mex. 696; Reverchon Texas Fl. 1618; Patterson Colorado Fl. 154.—JOHN DONNELL SMITH.

So much has been written concerning the methods of preparing specimens for the herbarium, that it would seem almost needless to make much addition thereto; but in looking through my own collection of tens of thousands of specimens it is a noticeable fact that certain ones strike the eye more forcibly than others. If I am examining a western plant I look for Pringle's or Greene's specimens; if central United States, I want Bebb's; if southern, I hunt up those of Curtiss and Garber; if from New Jersey, I search for a Parker label; and the reason is that invariably I find good characteristic specimens made by these notable botanists.

The great value of my herbarium to-day is in the large, abundant and characteristic specimens. I have picked up from time to time a great many fragments of plants in my travels as mementoes of a journey, or indicative of a locality, but I make it a rule, when I want to show what the plant really is, to get as large a specimen as my mounting paper will receive. If the plant is small I get several of them, and mount them all on the same sheet, flowering and fruiting specimens side by side, with separate labels giving dates of collection, locality, etc.

One can not but feel a regret in looking at the type specimens of Nuttall and others of his day, that they are such poor representatives; except that they are the original types they would possess but little value as showing the habit

of growth. Of course I well know that in that early botanical day the facilities for collecting and preserving were very poor, as journeys were made amid great danger and hardship. It is almost a wonder that anything collected by the pioneers of the western wilds has been preserved to us.

Do not collect specimens in the rain or when the dew is on, if it can be avoided, and always collect the best specimens, those that represent the habit of growth. Have a portfolio to lay them in immediately after gathering; the use of a tin box for that purpose is obsolete. The portfolio I use is made of two pieces of binders' board, each twelve by eighteen inches, and covered with leather, the pieces being so joined together as to form a book about four inches wide, a strong leather handle to carry by, and two straps to fasten on small hooks (rather than with a buckle) in front to keep tightly closed when not in use. Within this portfolio are loose leaves of heavy manilla paper, held in place by an elastic cord. Between these leaves I place the specimens as collected; if only a short ramble is made a few leaves will suffice; if for several days' collecting a reserve of dry leaves, to replace those dampened by continuous use, will be found of advantage. On the return home, I transfer all the specimens I desire to preserve, placing each between sheets of soft white paper, and these between the driers, and then the whole in the press. In the case of bushy specimens the impress of the stems sometimes makes wrinkles on others; this can be avoided by inserting a few thin boards through the package. In this way I have often had 200 or 300 specimens in press at one time. I have found a screw press the most serviceable.

The secret of making good specimens lies in the frequent changing of the plants, putting in fresh driers so as to take up the dampness as fast as possible. When I have a large number of plants in press and desire to hurry them through to make room for others, I have frequently warmed the driers before using, and then set the press where it got the benefit of the heat from the sun, and often with excellent success set the press near the fire, turning it frequently so that the heat might be evenly distributed.—Isaac C. Martindale.

Nearly thirty years ago, in connection with Messrs. Bebb, Canby and others, then young botanists, having done what I could to improve the quality of herbarium specimens and not have them mere collections of "dried tea leaves," I am glad to say a word in behalf of making a herbarium a "thing of beauty," as well as a storehouse of scientific facts. I have correspondents whose specimens are "a joy forever," so that it is always a new delight to get from them a fresh package, and the temptation is generally irresistible to add every one to my herbarium, no matter how many of that species I may already have. While there are others who are able to send rare and interesting species, their specimens constantly excite a righteous indignation that man should have it in his power so to deform and abuse the beauty of nature.

Where the species is abundant an inferior specimen should never be preserved; of Shortia we should be glad of any sort of specimen, even a fragment. For collecting the portfolio is greatly to be preferred to the old regulation tin box, except on long tramps to places seldom visited, where several hours, or

even days, may elapse before paper and press can be reached. I have now one battered old box which has traveled many hundreds of miles, and in which often ericaceous and orchidaceous plants from the Maine and New Hampshire mountains have been preserved several days, or even have come into full flower when home was reached, though only in bud when gathered.

After putting in press it is well to change the driers twice a day at first, and then once a day till the specimens are thoroughly dry. My habit is to use quite a heavy pressure, with plenty of driers between the specimens, as I think it shortens the time of drying, and gives to the petals a more endurring texture. I greatly prefer a lever press to either a screw or a strap, as the lever keeps the pressure constant, following the pile as it inevitably settles. My press consists of a heavy frame, with a lever six feet long, the pressure applied one foot from the fulcrum. I use a forty pound weight, so that by moving it along the lever it gives a pressure of from 40 to 200 pounds. For succulent and delicate plants of course I use more moderate pressure at first, increasing it as they become dry.—J. W. CHICKERING, JR.

For drying paper I use a good quality of "carpet-felting" or "carpet paper." I buy it by the roll and cut it up into sheets of the usual size (12 by 18 inches). I use no tissue paper in drying ordinary plants, using it for delicate ones only. My press is composed of two boards about twenty inches square (one for the floor, the other for the top), and my weight is a great stone. My botanizing case (pedantically called a *vasculum* in books, but never so far as I know so called by any one in the field) is twenty inches long, and is elliptical in cross-section, the measurements being $7\frac{1}{2}$ by $4\frac{1}{2}$ inches. The door or lid (which fits as tightly as possible) is on one side, and is $6\frac{1}{2}$ by $18\frac{1}{2}$ inches; in other words, it is very nearly as large as one whole side of the case. It is hinged below, and closes with a simple clasp above. The hinges are placed high enough on the side of the case so that when the lid is open the plants will not drop out.

I rarely carry my case by slinging a strap over my shoulder, but provide for such strap and use by having the usual rings or cleats attached at the ends and top. For ordinary use I have a common "tub-handle" fastened to the top of the case.—CHAS. E. BESSEY.

I am out in the woods, and am probably too late to be of any service to the herbarium number of the GAZETTE, so I will merely say that in making good clean herbarium specimens the important point is to dry them as quickly as possible. I have always used old newspapers for driers, and prefer a weight of 75 or 100 pounds to straps or screws.—A. W. CHAPMAN.

When not too large I collect the whole plant with the root attached. The roots of annuals especially should be collected, or enough to show the character of being an annual. The fruit should, whenever possible, be collected as soon as mature. Too little attention is given to this matter. Some of our best collectors almost invariably fail to collect fruit. Annuals can generally be collected so as to show both flowers and fruit on the same plant, but this is seldom the case with perennials. I have heard the complaint that some col-

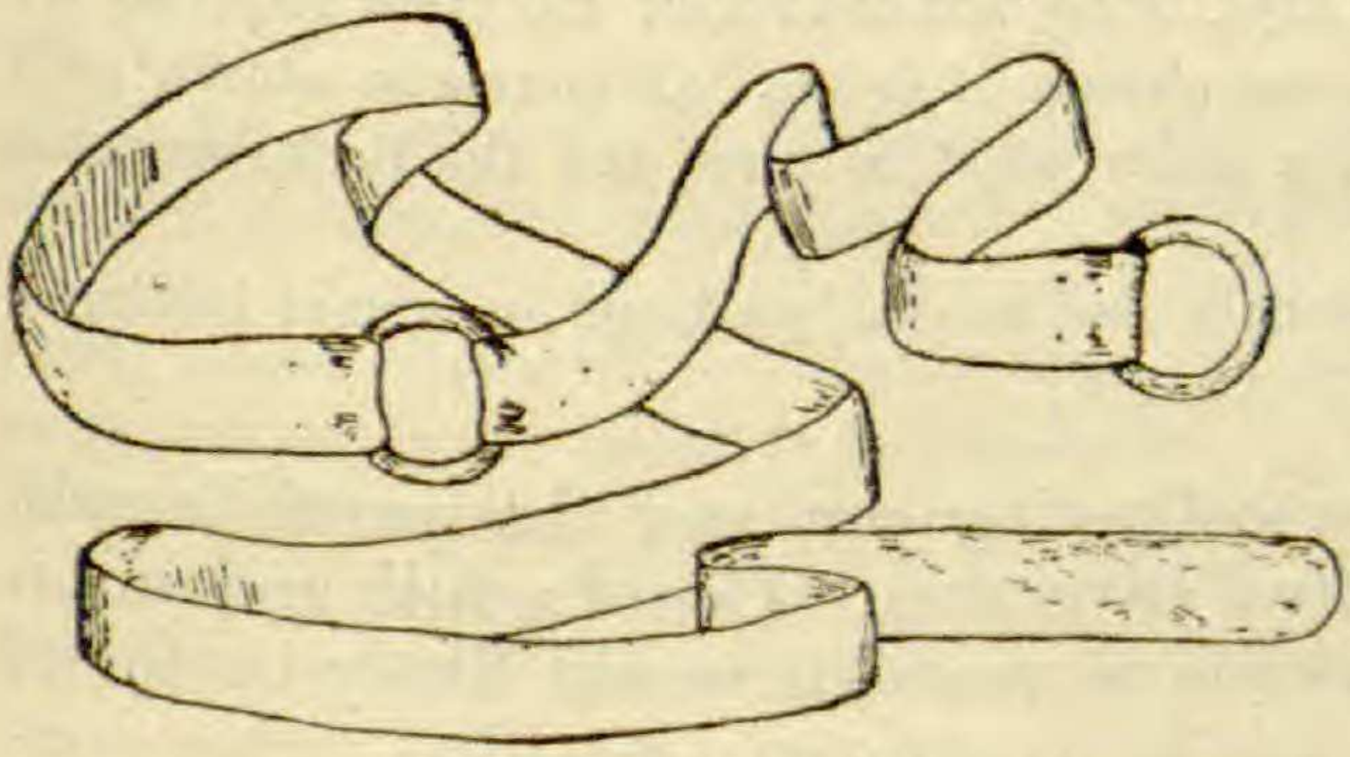
lectors are too scientific to be neat; but great care should be taken that in being neat the scientific features are not sacrificed.

In pressing I use a pressure of from 100 to 300 pounds, according to the character of the plants, or the number in press at one time.

Grasses and carices can be dried very quickly and well by using driers just after they are brought in from the hot sunshine; but for almost all other plants the driers should be thoroughly cooled before they are used, or else the plants will be blackened.

In my catalogues I mark all plants as I receive them as follows: – flowers only, – – fruit only, — flowers and fruit. By marking in this way I can easily tell by referring to my catalogue what is needed to complete any specimen, and can call for what is lacking of the first correspondent who offers the plant. I always make a note of the locality and date of collection of every plant as I find it, and when it occurs at a distance from home I place after the note the name of some plant which I know to be in flower at home, where I can see it every day, always using some plant which is just ready for collection for the first time during the season. For example, after Silene stellata I place in parenthesis (tem. Astragalus Canadensis); also for Carex Crawei I have (tem. C. Meadii). By making these notes I often save a long tramp to some favorite's haunt, only to find that I am either too early or too late.—R. I. CRATTY.

I do not know how generally the "saddle-girth" strap is used for obtaining pressure. It is made of two straps connected by a ring and with a ring at the end, the distance between the rings being such that they will just come in contact when the press is empty. The loose end is passed through both rings several times and then drawn tight and there is no slipping, and the pressure can be regulated nicely. Dr. P. R. Hay, of Racine, Wis., tells me that he first used the principle in the botanical press. My herbarium specimens are kept loose in sheets which are folded at the bottom and placed in portfolio covers so that they stand upright. The fold of the sheet, being at the bottom, prevents the falling out of small specimens, fruits, etc., and the sheets are easily run over in the search for a particular species.—J. J. DAVIS.



SADDLE-GIRTH STRAP.

In the pressing and drying of many plants in the orders Lycopodiaceæ, Cyperaceæ, and Gramineæ, and many others more conspicuous for a fibrous or chartaceous nature, considerable time and labor may be saved by ironing them with a common flat-iron, slightly cooler than is used by a tailor. By using one or two thicknesses of blotting paper and a hot iron, green specimens may be dried in a few seconds, with a result equal to that obtained by any other method.

Plants which are at all succulent do not do well under such treatment, as they become brittle and consequently useless.—CHAS. F. JOHNSON.

The way which has given me the best results is to carry a portable press into the field. Press 10 by 17 inches, secured by straps; two exterior boards half an inch thick, to separate the dry papers not in use from the damp ones containing plants. The middle board is only used on long trips, when it is necessary to dry the plants on the journey. At other times it is left at home. Felt gives uniformly better colors than paper. Its advantages are (1) uniformly better colors, (2) only one-quarter the time, (3) no work changing papers. The disadvantages are that only one layer, 6 or 8 specimens, can be dried at once.—CHARLES E. SMITH. [Upon examining specimens sent by Mr. Smith we testify to the much superior quality of those dried in felt.—EDS.]

I prefer the old fashioned tin box except for ferns and certain plants, like Rhexia, whose petals are extremely fugacious. The box requires less time to open, is more manageable in windy weather, preserves the plants fresh for examination at home, and is especially serviceable when some time must elapse before the plants can be placed in the press. The straw paper which some authors recommend for drying is unsatisfactory. The best quality of regular drying paper is the cheapest where good specimens count for anything and when time has any value.

However it may be with the portable wire presses sold by the dealers, a rude home-made affair has given me excellent results. With such a press I have dried specimens in three days, being less than half the time required by the board press, and with only one change of driers. Of course to obtain such results the best quality of drying paper must be used, and the packages must not be very thick.

I prefer to press pretty strongly and set the package on a roof having a southern exposure.—GERALD MCCARTHY.

It is probable that the collecting can and the portfolio will always have their respective advocates. Could a full and unbiased statement of their merits be made, it would likely be found that each has good cause for its continued existence. Our contributors have well brought out the value of the portfolio for collecting near home, when rambles do not exceed a few hours each, for preserving plants with delicate flowers or foliage, and of lightening subsequent work of arranging for the press; and the value of the collecting can for extended trips, for keeping plants fresh for further study before pressing, and for the opportunity it gives to do the work of selecting and arranging the specimens in press in the shade and comfort of one's home. The choice largely turns upon individual preferences, one prefers to do most of the work in the field, the other prefers to do it at home. But aside from personal tastes there are circumstances where now one and now the other method has decided advantages.—EDITORS.